

WHAT IS CLAIMED IS:

- Suba*
1. A method for reducing an amount of emissions from a gas turbine combustor using a water delivery system, the gas turbine engine including a lean premix type of combustor operable with a fuel/air mixture equivalence ratio less than one, the water delivery system connected to the gas turbine engine, said method comprising the steps of:
- 5 operating the gas turbine engine with a combustor fuel/air mixture equivalence ratio less than one; and
- supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of water and steam is injected
- 10 into the combustor.
2. A method in accordance with Claim 1 wherein the combustor includes a plurality of domes, said step of supplying at least one of water and steam further comprising the step of supplying at least one of water and steam to at least one of the plurality of domes.
- 15 *Sub C1*
3. A method in accordance with Claim 1 wherein the combustor includes a first dome, a second dome, and a third dome, the second dome disposed radially inward from the first dome and the third dome, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the combustor second dome.
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4. A method in accordance with Claim 1 wherein the combustor includes at least one dual fuel nozzle, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the combustor through at least one dual fuel nozzle.
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5. A method in accordance with Claim 1 wherein the gas turbine engine has a rated engine operating capability, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and

steam to the gas turbine engine when the engine is operating at an operating speed greater than approximately 90 percent rated engine power capability.

- 5 *Sub 2* 6. A combustor system for a gas turbine engine having a rated engine power capability, said combustor system comprising:
- a lean premix type of combustor configured to operate with a fuel/air mixture equivalence ratio less than one; and
- 10 a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of water and steam is injected into the combustor.
7. A combustor system in accordance with Claim 6 wherein said combustor comprises a plurality of domes.
8. A combustor system in accordance with Claim 7 wherein said water delivery sub-system further configured to supply at least one of water and steam to at
- 15 least one dome of said combustor.
9. A combustor system in accordance with Claim 8 wherein said combustor further comprises at least one dual fuel nozzle, said water delivery sub-system further configured to supply at least one of water and steam to said combustor through at least one dual fuel nozzle.
- 20 10. A combustor system in accordance with Claim 8 wherein said combustor further comprises at least one premixer in flow communication with said water delivery sub-system.
- 25 11. A combustor system in accordance with Claim 6 wherein said combustor comprises a first dome, a second dome, and a third dome, said second dome disposed between said first and third domes, said water delivery sub-system

further configured to supply at least one of water and steam to said combustor second dome.

12. A combustor system in accordance with Claim 6 wherein said water delivery sub-system selectively operable in a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system further configured to supply water to said combustor at a higher flow rate when in the second operating mode.

10 *Sub A3* 13. A combustor system in accordance with Claim 12 wherein said water delivery sub-system is further configured to supply water in the first operating mode when the gas turbine engine operates below a predefined percentage of the rated engine power and supply water in the second operating mode when the gas turbine engine operates above the predefined percentage of the rated engine power.

15 14. A gas turbine engine comprising a combustor system configured to reduce emissions from said gas turbine engine, said combustor system comprising a combustor and a water delivery sub-system, said combustor is a lean premix combustor configured to operate with a fuel/air mixture equivalence ratio less than one, said water delivery sub-system connected to said gas turbine engine and configured to supply at least one of water and steam to the gas turbine engine such that at least one of water and steam is injected into the combustor.

20 15. A gas turbine engine in accordance with Claim 14 wherein said combustor comprises at least one premixer, said water delivery sub-system further configured to supply at least one of water and steam to at least one premixer of said combustor.

25 *Sub A4* 16. A gas turbine engine in accordance with Claim 14 wherein said combustor comprises a plurality of domes, said water delivery sub-system further configured to supply at least one of water and steam to at least one dome of said combustor.

17. A gas turbine engine in accordance with Claim 16 wherein said combustor further comprises a first dome, a second dome, and a third dome, said second dome disposed between said first and third domes, said water delivery sub-system further configured to supply at least one of water and steam to said combustor second dome.

18. A gas turbine engine in accordance with Claim 14 wherein said water delivery sub-system selectively operable in a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system further configured to supply water to said combustor at a higher flow rate when in the second operating mode.

19. A gas turbine engine in accordance with Claim 18 wherein said gas turbine engine has a rated engine power capability, said water delivery sub-system further configured to supply water in the first operating mode when the gas turbine engine operates below a predefined percentage of the rated engine power and supply water in the second operating mode when the gas turbine engine operates above the predefined percentage of the rated engine power.

20. A gas turbine engine in accordance 19 wherein said water delivery sub-system further configured to supply water in the second operating mode when said gas turbine engine is operating at an operating speed greater than approximately 90 percent rated engine power capability.